THE INSTITUTION
OF ELECTRICAL
ENGINEERS

IEE PROCEEDINGS-A
covering
Physical Science, Measurement and Instrumentation, Management and Education, and Reviews

Vol. 131, 1984

Published by
The IEE, Savoy Place, London WC2R 0BL, England
Publishing Department: PO Box 8, Southgate House, Stevenage, Herts. SG1 1HQ, England

IEE Proceedings Part A

Physical Science · Measurement and Instrumentation · Management and Education · Reviews

The Institution of Electrical Engineers, Savoy Place, London WC2 0BL, England
Publishing Department: PO Box 8, Southgate House, Stevenage, Herts. SG1 1HQ., England

Volume 131 1984 UK ISSN 0143–702X

HONORARY EDITORS

Prof. F.A. Benson (*IEE Reviews*) *University of Sheffield*
Prof. D.T. Swift-Hook (*Special Issues*) *CERL*
Dr. B. Bolton (*Education*) *University of Bath*
D.L. Johnston (*Management*) *formerly Urwick Orr and Partners*
Dr. G.W. Chantry (*General*) *British Embassy, Bonn, W. Germany*

Pages in issues of *IEE Proceedings Part A*, 1984

Pages	Issue no.	Date
1–84	1	January
85–124	2	March
125–184	3	May
185–292	4	June
293–340	5	July
341–428	6	August
429–576	7	September
577–660	8	November
661–752	9	December

This publication is copyright under the Berne Convention and the International Copyright Convention. All rights reserved. Apart from any copying under the UK Copyright Act 1956, part 1, section 7, whereby a single copy of this article may be supplied, under certain conditions, for the purposes of research or private study, by a library of a class prescribed by the UK Board of Trade Regulations (Statutory Instruments, 1957, no. 868), no part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means without the prior permission of the copyright owners. Permission is, however, not required to copy abstracts of papers or articles on condition that a full reference to the source is shown.

An IEE licensing arrangement exists whereby organisations entering into an agreement are legally entitled to make up to ten copies of an IEE paper or article.

Authorisation to photocopy items for internal or personal use, or for the internal or personal use of specific clients, is granted by the Institution of Electrical Engineers for libraries and other users registered with the Copyright Clearance Center Transactional Reporting Service, provided that the base fee of $2.00 per copy is paid directly to the Copyright Clearance Center, Inc., 21 Congress Street, Salem, MA 01970, USA. 0143–702X/84 $2.00 + 0.00. This content does not extend to other kinds of copying, such as copying for general distribution, for advertising or promotional purposes, for creating new collective works, or for resale.

Photocopies of individual papers published in the *IEE Proceedings* can be supplied from the IEE Library at 10p per page plus a handling charge of 50p per paper, which covers the cost of surface mail (airmail extra). The handling charge is waived if reprints are collected from Savoy Place by purchasers.

The telephone number of the IEE London office is 01 240 1871; telex 261176.

The IEE is not as a body responsible for the opinions expressed by individual authors.
The IEE is a member of the Association of Learned & Professional Society Publishers.
© 1984: The Institution of Electrical Engineers:

Secretary of the IEE: H.H.W. Losty
Managing Editor: Bernard Dunkley; *Assistant Editors:* Irene Adams, Stephen Cokeham and Sonia Bartoluzzi
Graphics Manager: Maurice Partridge; *Marketing Manager*: Alan Baldwin

Typeset by: Santype International Ltd., Salisbury, Wilts.
Printed in England by: Unwin Brothers Ltd., Old Woking, Surrey

Index

IEE Proceedings A covering Physical Science, Measurement and Instrumentation, Management and Education, and Reviews

Vol. 131, 1984

ABBREVIATIONS

- p paper, address or lecture
- d discussion on a paper
- a abstract of paper or address
- e errata
- s synopsis of a paper published in full in another Part of the IEE Proceesings

IEE commissioned reviews

Benson. F.A., and Tischer, F.J. Some guiding structures for millimetre waves p429
Brown, J.E., and Jones, B.L. Electrical variable speed drives p516
Guile, A.E. Electric arcs: their electrode processes and engineering applications p450
Jervis, M.W. Control and instrumentation of large nuclear power stations. A review of future trends p481
Kay, L. Electronic aids for blind persons; an interdisciplinary subject p559

Author index

A

Ainscough, J.A., O'Connor, B., and Rakowski, R. see O'Connor, B.
Anderson, R.B., Van Niekerk, H.R., Kroninger, H., and Meal, D.V. Development and field evaluation of a lightning earth-flash counter p118
Au, S., Santiago, J., and Smy, P.R. Analysis of the arc formed along the surface of a flat plate immersed in a laminar flow of gas p605

B

Baker, S. Nationalised industries' overseas consultancies p428
Balchin, M.J., and Davidson, J.A.M. see Davidson, J.A.M.
Bates, R.H.T. Full-wave computed tomography. Pt. 1: Fundamental theory p610
Bates, R.H.T., Seagar, A.D., and Yeo, T.S. see Seagar, A.D.
Battersby, G.A., and Reed, K.B. Some ideas for a new style of electrical engineering degree course p673
Benson, F.A., Sali, S., and Sitch, J.E. see Sali, S.
Benson, F.A., and Tischer, F.J. Some guiding structures for millimetre waves p429
Bergen, S.A. Catastrophe model of the engineering design process p181
Berrie, T.W. Economics and technical consultancy p378
Beuret, G. Britain: Second best by choice? p668
Bidwell, R., and Johnson, R.H. Environmental consultancy p371
Bolton, B. Changing patterns in electrical and electronic engineering education (Editorial) p661
Bolton, B., France, J.T., and Prescott, A.J. A cooperative venture in electrical engineering education: designing a course p684
Bolton, B., and Spanyol, J.L. The place of innovative and commercial skills in engineering education in the UK p174
Bolton, B., and Spanyol, J.L. The product enterprise: activity programmes for engineering undergraduates p708
Bond, L.J. Ultrasonics (Editorial) p185
Bond, L.J., Punjani, M., and Saffari, N. Review of some recent advances in quantitative ultrasonic NDT p265
Bourne, R. The rise and fall of the HNC: long live the HNC! p745
Bowker, K.J., and Owen, R.C. Review of recent developments in ultrasonic NDT systems in the CEGB p252
Braham Levy, J., and Linkens, D.A. Spectral analysis of short-time biomedical data using adaptive filters p164
Brown, J.E., and Jones, B.L. see Jones, B.L.
Brown, R., and Chambers, B. see Chambers, B.
Burbridge, R.N.G. Address as Chairman of the IEE Management & Design Division: Some art, some science and a lot of feedback p24
Butcher, J. Challenges to engineering education p662

C

Carter, R.G. Engineering curriculum design p678
Chalmers, I.D., Farish, O., Gilbert, A., and Dupuy, J. Leader development in short point-plane gaps in compressed SF_6 p159
Chambers, B., and Brown, R. SHIPS: the Sheffield industrial project scheme p714
Cook, D.C., Plumb, I.C., and Haydon, S.C. see Plumb, I.C.
Cook, D.C., and Haydon, S.C. Laboratory investigations of RF plasmas relevant to CW arc pluming at high-power aerials. Pt. 2: Relevance of scale-model studies based on pulsed RF techniques p153
Cooper, J.A., Dewhurst, R.J., Moody, S., and Palmer, S.B. High-voltage spark discharge source as an ultrasonic generator p275
Cory, B.J., and Walker, L. see Walker, L.
Cristina, S., D'Amore, M., and Salerno, M. Microprocessor system for measuring frequency spectra and computing transient responses of a power apparatus p312
Culpan, E.A., and Dukes, R. see Dukes, R.

D

D'Amore, M., Cristina, S., and Salerno, M. see Cristina, S.
D'Amore, M., Daniele, V., and Ghione, G. New analytical approach for computing DC unipolar corona losses p318
Daniele, V., D'Amore, M., and Ghione, G. see D'Amore, M.
Davidson, J.A.M., and Balchin, M.J. Three-dimensional eddy-current calculation using loop variables to represent magnetic vector potential in conducting regions p577
Deacon, J.M., Lewis, M.F., West, C.L., and Humphryes, R.F. see Lewis, M.F.
Defranould, P. Bulk acoustic microwave delay lines: design, fabrication and performance p216
Dellow, F., and Prentice, J.W. Degrees for technician engineers p749
Dewhurst, R.J., Cooper, J.A., Moody, S., and Palmer, S.B. see Cooper, J.A.
Dukes, R., and Culpan, E.A. Acoustic emission: its techniques and applications p241
Dunlop, J. Multiuser microprocessor development system for undergraduate training p170
Dupuy, J., Chalmers, I.D., Farish, O., and Gilbert, A. see Chalmers, I.D.

E

Edwards, J.T. Role of the consultant in mass transit systems p406
El-Markabi, M.H.S., and Freeman, E.M. Normalised impedance of circular, trapezoidal and rectangular conductors in semiclosed slots: a unified transmission line approach p129
Excell, P.S. Ignition of flammable gas mixtures by X-band microwave discharges p103
Excell, P.S., and Rousseau, M. see Rousseau, M.

F

Falkner, A.H. Novel feedback capacitor-type gauge p93
Farish, O., Chalmers, I.D., Gilbert, A., and Dupuy, J. see Chalmers, I.D.
Foxell, C.A.P. Address as Chairman of the IEE Electronics Division: The business of VLSI p17
France, J.T., Bolton, B., and Prescott, A.J. see Bolton, B.
Fraser, J.R., and Penman, J. see Penman, J.
Freeman, E.M., Rajanathan, C.B., and Lowther, D.A. see Rajanathan, C.B.
Freeman, E.M., and El-Markabi, M.H.S. see El-Markabi, M.H.S.

G

Gaythorpe, R.S. The right tool for the job. Improving export sales p79
Ghione, G., D'Amore, M., and Daniele, V. see D'Amore, M.
Gilbert, A., Chalmers, I.D., Farish, O., and Dupuy, J. see Chalmers, I.D.
Godec, Z. New method for determination of steady-state temperature rises of transformers p307
Gosling, W. Changing rôle of the engineer in the electronics industry p665
Grant, P.M., and McMurtrie, R. Continuing education for industrial electronics graduates p734
Granville-George, D.A., and Woods, D. Dual 4-port bidirectional network analyser with vector-null detection for the frequency range 1–800 MHz p85
Grogan, W.R. System approach to a broader concept in engineering education: the WPI plan p676
Guile, A.E. Electric arcs: their electrode processes and engineering applications p450
Guile, A.E., Heylen, A.E.D., and Morgan, D.V. see Heylen, A.E.D.
Gura, J.H. Role of the building services engineering consultant p413

H

Hampshire, M.J., and Saunders, D.W. see Saunders, D.W.
Haydon, S.C., Plumb, I.C., and Cook, D.C. see Plumb, I.C.
Haydon, S.C., and Cook, D.C. see Cook, D.C.
Head, J.F. Role of the consultant in offshore oil industry projects p397
Heylen, A.E.D., Guile, A.E., and Morgan, D.V. Electron field emission from copper with various thicknesses of oxide film p111
Humphryes, R.F., Lewis, M.F., West, C.L., and Deacon, J.M. see Lewis, M.F.

J

Jack, M.A., and Robertson, J.M. Gateway: a teaching exercise in gate-array technology p722
Jervis, M.W. Control and instrumentation of large nuclear power stations. A review of future trends p481
John, M.N. Address as IEE President: Electricity supply—problems and possibilities p1
John, M.N. Consultancy (Editorial) p622
John, M.N. Consultancy (Editorial) p341 e622
Johnson, R.H., and Bidwell, R. see Bidwell, R.
Jones, B.L., and Brown, J.E. Electrical variable-speed drives p516

K

Kay, L. Electronic aids for blind persons: an interdisciplinary subject p559
Kennedy, G. Independent consulting engineering p343
King, R.W. Breadth at the top: the four-year degree in electronic engineering at the University of Southampton p690
Kroninger, H., Anderson, R.B., Van Niekerk, H.R., and Meal, D.V. see Anderson, R.B.

L

Laughton, M.A. University-based consultancy p362
Lewis, M.F., West, C.L., Deacon, J.M., and Humphryes, R.F. Recent developments in SAW devices p186
Linkens, D.A., and Braham Levy, J. see Braham Levy, J.
Livett, A.J., and Preston, R.C. see Preston, R.C.
Livingstone, A.W. An inside view of 'Japan inc.' p335

Lowther, D.A., Rajanathan, C.B., and Freeman, E.M. see Rajanathan, C.B.

M

M. Ashworth, J. The university as a business p635
Mann, D.G. Role of the consulting engineer in quality assurance p389
McColl, J.D. Address as Chairman of the IEE Power Division: AC/DC: one man's view p38
McMurtrie, R., and Grant, P.M. see Grant, P.M.
Meal, D.V., Anderson, R.B., Van Niekerk, H.R., and Kroninger, H. see Anderson, R.B.
Medley, J.E. Consultancy for industrial projects p423
Middleton, P.M., and Parish, A.R. see Parish, A.R.
Moody, S., Cooper, J.A., Dewhurst, R.J., and Palmer, S.B. see Cooper, J.A.
Morgan, D.V., Heylen, A.E.D., and Guile, A.E. see Heylen, A.E.D.
Muraleedharan, K.A., and Varadakumari, G. see Varadakumari, G.
Murdoch, G.B. Role of the consulting engineer in hydro and pumped storage systems p383

N

Nelson of Stafford, Lord. Export competitiveness: a factor of management and/or design. (The first Lord Nelson of Stafford Lecture) (Lecture) p626
Nettleton, M.A. Generation of blastwaves from confined electrical discharges p96

O

O'Connor, B., Ainscough, J.A., and Rakowski, R. Teaching innovations in the special engineering programme at Brunel University p697
Oka, H. New FM tachotelemeter using ferrite orthogonal cores p601
Omotayo, O.R. Performance of Videotex-to-speech convertor p328
Owen, R.C., and Bowker, K.J. see Bowker, K.J.

P

Palmer, S.B., Cooper, J.A., Dewhurst, R.J., and Moody, S. see Cooper, J.A.
Parish, A.R., and Middleton, P.M. The consultant's role in project management p420
Parkman, N. Scientific consultancy p355
Patecki, A., and Szymański, G. see Szymański, G.
Penman, J., and Fraser, J.R. Unified approach to problems in electromagnetism p55
Pillai, K.P.P., and Varadakumari, G. see Varadakumari, G.
Plumb, I.C., Cook, D.C., and Haydon, S.C. Laboratory investigations of pulsed RF plasmas relevant to CW arc pluming at high-power aerials. Pt. 1: Critical breakdown under pulsed RF conditions p145
Prentice, J.W., and Dellow, F. see Dellow, F.
Prescott, A.J., Bolton, B., and France, J.T. see Bolton, B.
Preston, R.C., and Livett, A.J. Medical ultrasonic standards at NPL p233
Punjani, M., Bond, L.J., and Saffari, N. see Bond, L.J.

R

Rajanathan, C.B., Lowther, D.A., and Freeman, E.M. -Finite-element analysis of the Xi-core levitator p62
Rakowski, R., O'Connor, B., and Ainscough, J.A. see O'Connor, B.
Rathore, T.S. Theorems on power, mean and RMS values of uniformly sampled periodic signals p598
Ray, P.K., and Sen, K.K. see Sen, K.K.
Reed, K.B., and Battersby, G.A. see Battersby, G.A.
Robertson, J.M., and Jack, M.A. see Jack, M.A.
Rousseau, M., and Excell, P.S. Optically coupled probe for microwave near-field measurements p74

S

Saffari, N., Bond, L.J., and Punjani, M. see Bond, L.J.
Salerno, M., Cristina, S., and D'Amore, M. see Cristina, S.
Sali, S., Benson, F.A., and Sitch, J.E. Coupling in a dielectric-coated multicoaxial-cable system. An analysis based on a quasi-TEM model p67
Santiago, J., Au, S., and Smy, P.R. see Au, S.
Saunders, D.W., and Hampshire, M.J. Teaching company scheme: a unique style of postgraduate activity with industry p728
Seagar, A.D., Yeo, T.S., and Bates, R.H.T. Full-wave computed tomography. Pt. 2: Resolution limits p616
Sen, K.K., and Ray, P.K. Energy partitioning in an inductively driven rail gun p140
Sitch, J.E., Sali, S., and Benson, F.A. see Sali, S.
Smy, P.R., Au, S., and Santiago, J. see Au, S.
Spanyol, J.L., and Bolton, B. see Bolton, B.
Stephen, K.D. The video-taped course revolution p739
Stewart, D.R. A small company's approach to designing for profit p623
Swift-Hook, D.T. Address as Chairman of the IEE Science, Education & Technology Division: Looking for alternatives p44
Szymański, G., and Patecki, A. Eddy-current losses in three-phase power cable and pipe-sheathing systems p125

T

Tischer, F.J., and Benson, F.A. see Benson, F.A.

V

Van Niekerk, H.R., Anderson, R.B., Kroninger, H., and Meal, D.V. see Anderson, R.B.
Varadakumari, G., and Muraleedharan, K.A. Viscous torque of disc-type magnetic fluid slip clutches p584
Varadakumari, G., and Pillai, K.P.P. Rheological behaviour of iron-silicone fluid mixtures used in magnetic slip clutches p591

W

Walker, L., and Cory, B.J. Four year Dainton course in electrical engineering at Imperial College p703
Weaver, L.J. Management consultants and technology p365
Wells, P.N.T. Medical ultrasonics p225
West, C.L., Lewis, M.F., Deacon, J.M., and Humphryes, R.F. see Lewis, M.F.
Westbrook, M.H. Address as Chairman of the IEE Computing & Control Division: The human body and its transducers: a real-time real-life computing and control system p10
Wheeler, C.B. Space-charge-limited electron current flow between coaxial cylinders and concentric spheres with ion production at an intermediate radius p325
Wiak, S. Method of calculation of the transient electromagnetic field in ferromagnetic materials for the known vector of induction B on the surface p293 e622
Wickramasinghe, H.K. Acoustic microscopy: present and future p282
Woods, D. Calibration of a precision three-port coaxial junction: a new component for immittance standardisation p302
Woods, D., and Granville-George, D.A. see Granville-George, D.A.

Y

Yeo, T.S., Seagar, A.D., and Bates, R.H.T. see Seagar, A.D.

Addresses

Burbridge, R.N.G. Address as Chairman of the IEE Management & Design Division: Some art, some science and a lot of feedback p24
Foxell, C.A.P. Address as Chairman of the IEE Electronics Division: The business of VLSI p17
John, M.N. Address as IEE President: Electricity supply—problems and possibilities p1
McColl, J.D. Address as Chairman of the IEE Power Division: AC/DC: one man's view p38
Swift-Hook, D.T. Address as Chairman of the IEE Science, Education & Technology Division: Looking for alternatives p44
Westbrook, M.H. Address as Chairman of the IEE Computing & Control Division: The human body and its transducers: a real-time real-life computing and control system p10

Subject index

ACOUSTICS

Acoustic emission: its techniques and applications. R. Dukes and E.A. Culpan p241
Acoustic microscopy: present and future. H.K. Wickramasinghe p282
Bulk acoustic microwave delay lines: design, fabrication and performance. P. Defranould p216

ACTUATORS

A small company's approach to designing for profit. D.R. Stewart p623

ADAPTIVE CONTROL

The human body and its transducers: a real-time real-life computing and control system. M.H. Westbrook p10

ARCING

Analysis of the arc formed along the surface of a flat plate immersed in a laminar flow of gas. S. Au, J. Santiago and P.R. Smy p605
Electric arcs: their electrode processes and engineering applications. A.E. Guile p450
Laboratory investigations of RF plasmas relevant to CW arc pluming at high-power aerials. Pt. 2: Relevance of scale-model studies based on pulsed RF techniques. D.C. Cook and S.C. Haydon p153

BIOMEDICAL ENGINEERING

Electronic aids for blind persons: an interdisciplinary subject. L. Kay p559
Full-wave computed tomography. Pt. 1: Fundamental theory. R.H.T. Bates p610
Full-wave computed tomography. Pt. 2: Resolution limits. A.D. Seagar, T.S. Yeo and R.H.T. Bates p616
Medical ultrasonic standards at NPL. R.C. Preston and A.J. Livett p233
Medical ultrasonics. P.N.T. Wells p225
Performance of Videotex-to-speech convertor. O.R. Omotayo p328
Spectral analysis of short-time biomedical data using adaptive filters. J. Braham Levy and D.A. Linkens p164

BREAKDOWN AND GAS DISCHARGES

Analysis of the arc formed along the surface of a flat plate immersed in a laminar flow of gas. S. Au, J. Santiago and P.R. Smy p605
Electric arcs: their electrode processes and engineering applications. A.E. Guile p450
Space-charge-limited electron current flow between coaxial cylinders and concentric spheres with ion production at an intermediate radius. C.B. Wheeler p325

CABLES AND OVERHEAD LINES

Eddy-current losses in three-phase power cable and pipe-sheathing systems. G. Szymański and A. Patecki p125

CALIBRATION

Calibration of a precision three-port coaxial junction: a new component for immittance standardisation. D. Woods p302

CIRCUIT THEORY AND DESIGN

Gateway: a teaching exercise in gate-array technology. M.A. Jack and J.M. Robertson p722

COAXIAL CABLES

Coupling in a dielectric-coated multicoaxial-cable system. An analysis based on a quasi-TEM model. S. Sali, F.A. Benson and J.E. Sitch p67

COMPONENTS

The business of VLSI. C.A.P. Foxell p17

COMPUTER APPLICATIONS

Control and instrumentation of large nuclear power stations. A review of future trends. M.W. Jervis p481
Full-wave computed tomography. Pt. 1: Fundamental theory. R.H.T. Bates p610
Full-wave computed tomography. Pt. 2: Resolution limits. A.D. Seagar, T.S. Yeo and R.H.T. Bates p616
Multiuser microprocessor development system for undergraduate training. J. Dunlop p170
Performance of Videotex-to-speech convertor. O.R. Omotayo p328

CONDUCTORS AND CONDUCTIVITY

Eddy-current losses in three-phase power cable and pipe-sheathing systems. G. Szymański and A. Patecki p125
New analytical approach for computing DC unipolar corona losses. M. D'Amore, V. Daniele and G. Ghione p318
Normalised impedance of circular, trapezoidal and rectangular conductors in semiclosed slots: a unified transmission line approach. M.H.S. El-Markabi and E.M. Freeman p129

CONTROL EQUIPMENT AND APPLICATIONS

Control and instrumentation of large nuclear power stations. A review of future trends. M.W. Jervis p481

CONTROL SYSTEMS

Electrical variable-speed drives. B.L. Jones and J.E. Brown p516
The human body and its transducers: a real-time real-life computing and control system. M.H. Westbrook p10

CONVERTORS

AC/DC: one man's view. J.D. McColl p38
Electrical variable-speed drives. B.L. Jones and J.E. Brown p516

DELAY LINES

Bulk acoustic microwave delay lines: design, fabrication and performance. P. Defranould p216

DIGITAL INSTRUMENTATION

Theorems on power, mean and RMS values of uniformly sampled periodic signals. T.S. Rathore p598

DISCHARGES, ELECTRIC

Electric arcs: their electrode processes and engineering applications. A.E. Guile p450
High-voltage spark discharge source as an ultrasonic generator. J.A. Cooper, R.J. Dewhurst, S. Moody and S.B. Palmer p275
Laboratory investigations of RF plasmas relevant to CW arc pluming at high-power aerials. Pt. 2: Relevance of scale-model studies based on pulsed RF techniques. D.C. Cook and S.C. Haydon p153
Laboratory investigations of pulsed RF plasmas relevant to CW arc pluming at high-power aerials. Pt. 1: Critical breakdown under pulsed RF conditions. I.C. Plumb, D.C. Cook and S.C. Haydon p145
New analytical approach for computing DC unipolar corona losses. M. D'Amore, V. Daniele and G. Ghione p318

DISCHARGES, GAS

Analysis of the arc formed along the surface of a flat plate immersed in a laminar flow of gas. S. Au, J. Santiago and P.R. Smy p605
Electric arcs: their electrode processes and engineering applications. A.E. Guile p450
Laboratory investigations of RF plasmas relevant to CW arc pluming at high-power aerials. Pt. 2: Relevance of scale-model studies based on pulsed RF techniques. D.C. Cook and S.C. Haydon p153
Laboratory investigations of pulsed RF plasmas relevant to CW arc pluming at high-power aerials. Pt. 1: Critical breakdown under pulsed RF conditions. I.C. Plumb, D.C. Cook and S.C. Haydon p145
Leader development in short point-plane gaps in compressed SF_6. I.D. Chalmers, O. Farish, A. Gilbert and J. Dupuy p159

EDDY CURRENTS

Eddy-current losses in three-phase power cable and pipe-sheathing systems. G. Szymański and A. Patecki p125
Three-dimensional eddy-current calculation using loop variables to represent magnetic vector potential in conducting regions. J.A.M. Davidson and M.J. Balchin p577

EDUCATION AND TRAINING

A co-operative venture in electrical engineering education: designing a course. B. Bolton, J.T. France and A.J. Prescott p684
Breadth at the top: the four-year degree in electronic engineering at the University of Southampton. R.W. King p690
Britain: Second best by choice?. G. Beuret p668
Challenges to engineering education. J. Butcher p662
Changing patterns in electrical and electronic engineering education (Editorial). B. Bolton p661
Changing rôle of the engineer in the electronics industry. W. Gosling p665
Continuing education for industrial electronics graduates. P.M. Grant and R. McMurtrie p734
Degrees for technician engineers. F. Dellow and J.W. Prentice p749
Design and innovation. p654
Economics and technical consultancy. T.W. Berrie p378
Engineering curriculum design. R.G. Carter p678
Four year Dainton course in electrical engineering at Imperial College. L. Walker and B.J. Cory p703
Gateway: a teaching exercise in gate-array technology. M.A. Jack and J.M. Robertson p722
Multiuser microprocessor development system for undergraduate training. J. Dunlop p170
SHIPS: the Sheffield industrial project scheme. B. Chambers and R. Brown p714
Some ideas for a new style of electrical engineering degree course. G.A. Battersby and K.B. Reed p673
System approach to a broader concept in engineering education: the WPI plan. W.R. Grogan p676
Teaching company scheme: a unique style of postgraduate activity with industry. D.W. Saunders and M.J. Hampshire p728
Teaching innovations in the special engineering programme at Brunel University. B. O'Connor, J.A. Ainscough and R. Rakowski p697
The place of innovative and commercial skills in engineering education in the UK. B. Bolton and J.L. Spanyol p174
The product enterprise: activity programmes for engineering undergraduates. B. Bolton and J.L. Spanyol p708
The rise and fall of the HNC: long live the HNC!. R. Bourne p745
The university as a business. J. M. Ashworth p635
The video-taped course revolution. K.D. Stephen p739
University-based consultancy. M.A. Laughton p362

ELECTROMAGNETICS

Coupling in a dielectric-coated multicoaxial-cable system. An analysis based on a quasi-TEM model. S. Sali, F.A. Benson and J.E. Sitch p67
Energy partitioning in an inductively driven rail gun. K.K. Sen and P.K. Ray p140
Generation of blastwaves from confined electrical discharges. M.A. Nettleton p96
Method of calculation of the transient electromagnetic field in ferromagnetic materials for the known vector of induction B on the surface. S. Wiak p293 e622
Some guiding structures for millimetre waves. F.A. Benson and F.J. Tischer p429
Three-dimensional eddy-current calculation using loop variables to represent magnetic vector potential in conducting regions. J.A.M. Davidson and M.J. Balchin p577

Unified approach to problems in electromagnetism. J. Penman and J.R. Fraser p55
Viscous torque of disc-type magnetic fluid slip clutches. G. Varadakumari and K.A. Muraleedharan p584

ELECTRON DEVICES

Electron field emission from copper with various thicknesses of oxide film. A.E.D. Heylen, A.E. Guile and D.V. Morgan p111

ELECTRONIC CIRCUITS

The business of VLSI. C.A.P. Foxell p17

ENERGY CONVERSION AND STORAGE

Electricity supply—problems and possibilities. M.N. John p1
Looking for alternatives. D.T. Swift-Hook p44

ENGINEERING ADMINISTRATION AND MANAGEMENT

A small company's approach to designing for profit. D.R. Stewart p623
An inside view of 'Japan inc.'. A.W. Livingstone p335
Catastrophe model of the engineering design process. S.A. Bergen p181
Consultancy (Editorial). M.N. John p341 e622
Consultancy for industrial projects. J.E. Medley p423
Design—the requirements of maintenance. p646
Economics and technical consultancy. T.W. Berrie p378
Environmental consultancy. R. Bidwell and R.H. Johnson p371
Export competitiveness: a factor of management and/or design. (The first Lord Nelson of Stafford Lecture). Lord Nelson of Stafford p626
Independent consulting engineering. G. Kennedy p343
Management consultants and technology. L.J. Weaver p365
Management for profit—by product design. p642
Nationalised industries' overseas consultancies. S. Baker p428
Role of the building services engineering consultant. J.H. Gura p413
Role of the consultant in mass transit systems. J.T. Edwards p406
Role of the consultant in offshore oil industry projects. J.F. Head p397
Role of the consulting engineer in hydro and pumped storage systems. G.B. Murdoch p383
Role of the consulting engineer in quality assurance. D.G. Mann p389
Scientific consultancy. N. Parkman p355
The consultant's role in project management. A.R. Parish and P.M. Middleton p420
The right tool for the job. Improving export sales. R.S. Gaythorpe p79
University-based consultancy. M.A. Laughton p362

FEEDBACK

Novel feedback capacitor-type gauge. A.H. Falkner p93

FERRITES AND FERROMAGNETICS

New FM tachotelemeter using ferrite orthogonal cores. H. Oka p601

FERROMAGNETICS

Method of calculation of the transient electromagnetic field in ferromagnetic materials for the known vector of induction *B* on the surface. S. Wiak p293 e622
New FM tachotelemeter using ferrite orthogonal cores. H. Oka p601

GENERATORS

AC/DC: one man's view. J.D. McColl p38

INSTRUMENTATION AND MEASURING SCIENCE

New FM tachotelemeter using ferrite orthogonal cores. H. Oka p601
Theorems on power, mean and RMS values of uniformly sampled periodic signals. T.S. Rathore p598

INTEGRATED CIRCUITS

Gateway: a teaching exercise in gate-array technology. M.A. Jack and J.M. Robertson p722
Some guiding structures for millimetre waves. F.A. Benson and F.J. Tischer p429
The business of VLSI. C.A.P. Foxell p17

IONISATION

Laboratory investigations of pulsed RF plasmas relevant to CW arc pluming at high-power aerials. Pt. 1: Critical breakdown under pulsed RF conditions. I.C. Plumb, D.C. Cook and S.C. Haydon p145
Leader development in short point-plane gaps in compressed SF_6. I.D. Chalmers, O. Farish, A. Gilbert and J. Dupuy p159
New analytical approach for computing DC unipolar corona losses. M. D'Amore, V. Daniele and G. Ghione p318
Space-charge-limited electron current flow between coaxial cylinders and concentric spheres with ion production at an intermediate radius. C.B. Wheeler p325

LIGHTNING AND LIGHTNING PROTECTION

Development and field evaluation of a lightning earth-flash counter. R.B. Anderson, H.R. Van Niekerk, H. Kroninger and D.V. Meal p118

MAGNETIC DEVICES AND PROPERTIES

Finite-element analysis of the Xi-core levitator. C.B. Rajanathan, D.A. Lowther and E.M. Freeman p62
Rheological behaviour of iron-silicone fluid mixtures used in magnetic slip clutches. G. Varadakumari and K.P.P. Pillai p591
Viscous torque of disc-type magnetic fluid slip clutches. G. Varadakumari and K.A. Muraleedharan p584

MAGNETIC FIELDS

Three-dimensional eddy-current calculation using loop variables to represent magnetic vector potential in conducting regions. J.A.M. Davidson and M.J. Balchin p577
Unified approach to problems in electromagnetism. J. Penman and J.R. Fraser p55

MATHEMATICAL TECHNIQUES

Dual 4-port bidirectional network analyser with vector-null detection for the frequency range 1–800 MHz. D.A. Granville-George and D. Woods p85
Finite-element analysis of the Xi-core levitator. C.B. Rajanathan, D.A. Lowther and E.M. Freeman p62
Full-wave computed tomography. Pt. 1: Fundamental theory. R.H.T. Bates p610
Method of calculation of the transient electromagnetic field in ferromagnetic materials for the known vector of induction *B* on the surface. S. Wiak p293 e622
New method for determination of steady-state temperature rises of transformers. Z. Godec p307
Spectral analysis of short-time biomedical data using adaptive filters. J. Braham Levy and D.A. Linkens p164

MEASUREMENT AND MEASURING

Microprocessor system for measuring frequency spectra and computing transient responses of a power apparatus. S. Cristina, M. D'Amore and M. Salerno p312
New method for determination of steady-state temperature rises of transformers. Z. Godec p307
Novel feedback capacitor-type gauge. A.H. Falkner p93
Rheological behaviour of iron-silicone fluid mixtures used in magnetic slip clutches. G. Varadakumari and K.P.P. Pillai p591

MICROPROCESSORS

Microprocessor system for measuring frequency spectra and computing transient responses of a power apparatus. S. Cristina, M. D'Amore and M. Salerno p312
Multiuser microprocessor development system for undergraduate training. J. Dunlop p170

MICROSCOPES

Acoustic microscopy: present and future. H.K. Wickramasinghe p282

MICROWAVE COMPONENTS

Bulk acoustic microwave delay lines: design, fabrication and performance. P. Defranould p216
Calibration of a precision three-port coaxial junction: a new component for immittance standardisation. D. Woods p302
Dual 4-port bidirectional network analyser with vector-null detection for the frequency range 1–800 MHz. D.A. Granville-George and D. Woods p85

MICROWAVE MEASUREMENTS

Optically coupled probe for microwave near-field measurements. M. Rousseau and P.S. Excell p74

MICROWAVE SYSTEMS

Ignition of flammable gas mixtures by X-band microwave discharges. P.S. Excell p103

MOTORS

Electrical variable-speed drives. B.L. Jones and J.E. Brown p516

NETWORKS

Dual 4-port bidirectional network analyser with vector-null detection for the frequency range 1–800 MHz. D.A. Granville-George and D. Woods p85

OPTICAL FIBRES

Optically coupled probe for microwave near-field measurements. M. Rousseau and P.S. Excell p74

PLASMAS

Laboratory investigations of RF plasmas relevant to CW arc pluming at high-power aerials. Pt. 2: Relevance of scale-model studies based on pulsed RF techniques. D.C. Cook and S.C. Haydon p153
Laboratory investigations of pulsed RF plasmas relevant to CW arc pluming at high-power aerials. Pt. 1: Critical breakdown under pulsed RF conditions. I.C. Plumb, D.C. Cook and S.C. Haydon p145

POWER ELECTRONICS

Electrical variable-speed drives. B.L. Jones and J.E. Brown p516

POWER SYSTEMS AND PLANT

Control and instrumentation of large nuclear power stations. A review of future trends. M.W. Jervis p481
Role of the consulting engineer in hydro and pumped storage systems. G.B. Murdoch p383
Some art, some science and a lot of feedback. R.N.G. Burbridge p24

PRODUCTION ENGINEERING

Export competitiveness: a factor of management and/or design. (The first Lord Nelson of Stafford Lecture). Lord Nelson of Stafford p626
Management for profit—by product design. p642

PROJECT AND PRODUCTION ENGINEERING

Consultancy for industrial projects. J.E. Medley p423
Economics and technical consultancy. T.W. Berrie p378
Independent consulting engineering. G. Kennedy p343
Management for profit—by product design. p642
Role of the consultant in offshore oil industry projects. J.F. Head p397
Role of the consulting engineer in quality assurance. D.G. Mann p389
The consultant's role in project management. A.R. Parish and P.M. Middleton p420

RAILWAY ELECTRIFICATION AND TRANSPORTATION

AC/DC: one man's view. J.D. McColl p38

REVIEWS OF PROGRESS

Development and field evaluation of a lightning earth-flash counter. R.B. Anderson, H.R. Van Niekerk, H. Kroninger and D.V. Meal p118
Electronic aids for blind persons: an interdisciplinary subject. L. Kay p559
Review of some recent advances in quantitative ultrasonic NDT. L.J. Bond, M. Punjani and N. Saffari p265

SIGNAL PROCESSING

The human body and its transducers: a real-time real-life computing and control system. M.H. Westbrook p10

SIMULATION

Catastrophe model of the engineering design process. S.A. Bergen p181
Microprocessor system for measuring frequency spectra and computing transient responses of a power apparatus. S. Cristina, M. D'Amore and M. Salerno p312
Normalised impedance of circular, trapezoidal and rectangular conductors in semiclosed slots: a unified transmission line approach. M.H.S. El-Markabi and E.M. Freeman p129

SPEECH SYNTHESIS

Performance of Videotex-to-speech convertor. O.R. Omotayo p328

STANDARDISATION AND STANDARDS

Calibration of a precision three-port coaxial junction: a new component for immittance standardisation. D. Woods p302
Medical ultrasonic standards at NPL. R.C. Preston and A.J. Livett p233

SURFACE-ACOUSTIC-WAVE DEVICES (SAW)

Recent developments in SAW devices. M.F. Lewis, C.L. West, J.M. Deacon and R.F. Humphryes p186

TELETEXT

Performance of Videotex-to-speech convertor. O.R. Omotayo p328

TRACTION

AC/DC: one man's view. J.D. McColl p38

TRANSDUCERS

The human body and its transducers: a real-time real-life computing and control system. M.H. Westbrook p10

TRANSFORMERS

Microprocessor system for measuring frequency spectra and computing transient responses of a power apparatus. S. Cristina, M. D'Amore and M. Salerno p312
New method for determination of steady-state temperature rises of transformers. Z. Godec p307

TRANSMISSION-LINES

New analytical approach for computing DC unipolar corona losses. M. D'Amore, V. Daniele and G. Ghione p318
Normalised impedance of circular, trapezoidal and rectangular conductors in semiclosed slots: a unified transmission line approach. M.H.S. El-Markabi and E.M. Freeman p129

TRANSPORTATION

Role of the consultant in mass transit systems. J.T. Edwards p406

ULTRASONICS

Acoustic emission: its techniques and applications. R. Dukes and E.A. Culpan p241
Bulk acoustic microwave delay lines: design, fabrication and performance. P. Defranould p216
High-voltage spark discharge source as an ultrasonic generator. J.A. Cooper, R.J. Dewhurst, S. Moody and S.B. Palmer p275
Medical ultrasonic standards at NPL. R.C. Preston and A.J. Livett p233
Medical ultrasonics. P.N.T. Wells p225
Recent developments in SAW devices. M.F. Lewis, C.L. West, J.M. Deacon and R.F. Humphryes p186
Review of recent developments in ultrasonic NDT systems in the CEGB. K.J. Bowker and R.C. Owen p252
Review of some recent advances in quantitative ultrasonic NDT. L.J. Bond, M. Punjani and N. Saffari p265
Ultrasonics (Editorial). L.J. Bond p185

VERY LARGE SCALE INTEGRATION

Gateway: a teaching exercise in gate-array technology. M.A. Jack and J.M. Robertson p722

WAVEGUIDES

Some guiding structures for millimetre waves. F.A. Benson and F.J. Tischer p429

WIND POWER

Looking for alternatives. D.T. Swift-Hook p44

Conference publications

233 Energy options: The role of alternatives in the world energy scene p300

Lectures

Nelson of Stafford, Lord. Export competitiveness: a factor of management and/or design. (The first Lord Nelson of Stafford Lecture) p626

Book reviews

Electric plasmas: their nature and uses. A. Von Engel p641
Electromagnetism: paths to research. D. Teplitz (Ed.) p139
Energy in electromagnetism. H.G. Booker p128
Field and wave electromagnetics. D.K. Cheng p660
Materials and apparatus in quantum radiophysics. N.G. Basov (Ed.) p95
Solid hydrogen. Theory of the properties of solid H_2, HD and D_2. J. Van Kranendonk p306
The application of laser light scattering to the study of biological motion. J.C. Earnshaw and M.W. Steer (Eds.) p144